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AUTHOR Paine, Nigel
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ABSTRACT

This paper examines various uses of new technologies in open learning, including methods of electronic delivery and computer assisted and managed learning, and contrasts their specific applications in the areas of administration, delivery of materials, production of materials, student support, and presentation of the materials. New technologies for student support are discussed, including videotex and telesoftware, which enables a user to download either text files or computer programs from a central computer to a remote learner. Characteristics of new technology are examined as they relate to the requirements of open learning materials, which should be individualized, self-pacing, and interactive. A summary list of benefits and constraints related to the use of new technologies in open learning is provided. (LMM)

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NEW TECHNOLOGY IN OPEN LEARNING

OLP : 403

NIGEL PAINE DECEMBER 1984

SCET OPEN LEARNING PROJECT

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INTRODUCTION

Information technology is about keeping track of and transmitting large amounts of information over variable distances, so new technology in open learning must be able to diminish the distance which separates teacher and learner.

This paper introduces the varied uses of new technologies in open learning and contrasts those utilised in areas such as administration, delivery of materials, production of materials, student support, and also in the presentation of the materials themselves. It does not concentrate merely on methods of electronic delivery and computer assisted/managed learning, but also examines the context in which they can be used.

INFORMATION TECHNOLOGY IN OPEN LEARNING NIGEL PAINE 30.5.84

One of the basic structuring principles of an Open Learning System is the separation between teacher and learner. This does not necessarily involve the separation of learner from learning centre, or, does not exclude the use of mediating co-ordinators or professionals to encourage and stimulate. There is, however, a gap between the content expert and the learning individual or learning group. The content expertise necessary for learning to take place is often packaged and thereby distributed and delivered.

New technology in general, and information technology in particular, are about the ability to keep track of large amounts of information and transmit that information over variable distances. Therefore, the use of new technology in open learning must be able to diminish that distance which separates teacher and learner. Every innovation in using new technology in this way is obviously worth encouraging and stimulating.

Where Is New Technology In Open Learning?

This paper will be structured around the various uses of the new technologies in open learning. It is necessary, as a primary distinction, to underline the difference between new technology in:

Administration

Delivery of materials

Production of materials

Student support

and as a way of presenting the materials themselves

Some of these areas are actually inter-dependent, but often they are mutually exclusive. It is quite possible to have a very sophisticated computer based administration system that keeps track of all student/tutor contacts, materials despatch, student progress etc. with a completely conventional print based materials resource and a wholly conventional correspondence type of support. It is unlikely in the sense that in depth development of one area will suggest others, but it is, nevertheless, possible.

In discussing the role of new technology in open learning, each separate area has a place. This paper will not concentrate merely on the methods of electronic delivery and/or computer assisted or computer managed learning but will also examine the context in which they can be used.

Computer Based Administration

Whenever a College or learning centre move over to some form of open learning the ratio of teaching hours to administration hours rises. Inevitably when people are away from the learning centre there is more emphasis on an efficient clerical and administrative support to the tutors, the course co-ordinator and the students. It is obvious that some kind of computerisation will make the system more flexible and more efficient. It could be argued that the Open University of Great Britain would find it impossible to operate without the computerisation of the whole administrative system. Introduction of the mainframe based administrative structure, makes the University a viable entity.

What I am discussing is not really the need for computerisation on that kind of scale where it is inevitable and will be developed by specialists, I am talking about the benefits of computerising relatively small schemes where it is quite possible to administer them without computers.

There are many simple database management programs which run on standard micro-computers which adequately cope with student numbers up to approximately 1,000 students on a variety of different courses, and with a variety of different tutors. Once this system has been set up, it does not merely duplicate the existing traditional administrative procedures - it enhances them. So the benefits of computerisation are really to create a more efficient existing practice, also to offer more to your students and more to your support staff.

At a basic level a small micro-based system can keep the names and addresses of students, the courses in which they have enrolled and whether they have paid their fees. It can match tutors to students; provide lists of students for tutors; provide address labels for the various mailings and keep track of what material has been sent out to students.(1)

At a more sophisticated level each student can have a record which can be updated whenever tutor/student contact is made or an assignment sent and graded. This will allow instant access to data such as "which students are more than one week late with a particular assignment" or "which students have still not paid their fees by week x". This information can then be dealt with in the conventional way.

At a more sophisticated stage still, where perhaps a word processing package can interact with a database package, the students who are late with a particular assignment can have a letter sent to them, generated by the micro-computer. This can be sent together with a note to the tutor, again generated by the computer, informing him or her that the student is late and asking him or her to maintain contact. This kind of flexibility and instant access to information can allow a more flexible entry system onto the course and a more self-paced structure to emerge. This has obviously considerable benefits to the student. All of the functions that I have mentioned are freely available in off-the-shelf packages and need very little computer expertise to implement. Having said that, there are always problems when new software is developed for a specific function, and having someone with an ability to manipulate that software can be of considerable advantage.

There are countless examples of Companies and Colleges which have gone over to a computerised system far too quickly and have lost vast amounts of information when the system has failed in some way. The lesson from this is that the computerised system and the manual system need to be operated in parallel for a length of time which will allow all the "bugs" to be removed from the computerised system and its failings noted and corrected before the manual system is abandoned. This obviously involves a considerable investment of time and energy over a limited period before the benefits start to accrue. It is also important that the question of what you want from the computerised system is carefully thought out before you embark on computerisation. No institution that I have come across which has developed a computerised system has regretted that development, and most can point to additional benefits they had not really taken into account when they began to put the system into operation.

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(1) For more details see: 'Computer Assisted Management of a Flexistudy' Scheme by Graham Bacon and Judith Warren
SCET Open Learning Paper 303 April 1984

On another note, the postgraduate course at Dundee College of Education offered by Distance Learning is still administered manually. Dundee had designed a specific card to enter the student data on for the eventual computerisation of the system. When the card had been produced they found it so useful and well structured that they abandoned plans to computerise the system and merely worked from a manual file of these cards. The plan to computerise helped them structure and define their needs far more coherently than they had previously. But they held back from actually going 'computer' in any shape or form.

Computerised Production Of The Materials

The ability to store text on disk, modify or alter that material whenever necessary and print out fresh clean copy is an invaluable aid for any group, institution or centre developing open learning systems. Conventional, print based units can have a very exciting and efficient history before they emerge as print. Most open learning systems are now getting involved in word processing at some stage or another.

A great advantage of having materials stored on disk is that it obviates the need to make expensive long print runs which entail warehousing large amounts of material and prevent modification of that material for several years.

The ability of computers to send data across great distances at great speed is no recent innovation. Now for example, using a relatively cheap modem hooked to a micro-computer, a text file can be sent along the telephone line to be stored in the memory of another micro that need not be of the same make, only possessing a similar operating system.

What this means is that materials stored as text can be accessed instantly in a number of locations. On one level it would allow more efficient contact between the writer of a Unit and the editor or publisher where drafts could be corrected on screen and sent back to the writer for amendment etc. Several movements in either direction could be carried out without having to produce any paper copies at all.

At another level, entirely, a prospective student could scan through a range of courses using, say, an interactive videotex system set up in his or her own home. When the potential student sees the course he or she would like to enrol in he or she could electronically "fill in" an enrolment application, have his or her bank account electronically debited and have the first Unit downloaded onto his or her micro. He or she would then have the choice of either working through the material on screen or taking away a 'hard' copy to study elsewhere. A bookshop also listed on the videotex system could be contacted and any necessary textbooks ordered electronically, but delivered by post.

The use of new technologies is now speeding up the printing process; making more efficient the editing process and allowing much lower stocks of material to be held. This makes adaption and up-dating more cost-effective and faster.

With large Xerox machines capable of printing to off-set litho standards at a very fast rate, it is conceivable that a given institution could survive by printing only on demand. All that is stored is a clean master copy which can easily be modified or amended for whatever reason.

If you decide, therefore, that most of your learning materials will be print based, there is much that new technology can offer to make that system faster and more efficient. This can range from simple word processing to word processors linked electronically to typesetting machines for a comprehensive on-line service up to the point of actual printing.

New Technologies For Support

A rather old technology is the telephone. When this is coupled with innovations, such as bridges which allow up to fifteen separate callers on separate lines to speak with one another you add another dimension to student support. The conference call tutorial has been used extensively for support to remotely located students in Scotland.(2) Firstly by pioneering work of the Open University in Scotland and then by other centres offering a range of courses.

If you couple the telephone line to a computer at one end and add a modified television or micro-computer at the other end you have a powerful range of facilities for the remote learner or even for the learner based in an institution but following a more individualised or self-directed path.

These include: Videotex which is very user-friendly and allows a person to access masses of information stored on a central computer using a simple key-pad. It is an interactive system so messages, requests or answers to text can be sent back to the information provider.

Videotex format could provide: learning material; a notice board facility; an electronic mailbox service; an electronic listing and assessment service and perhaps most exciting of all: telesoftware.

Telesoftware enables a user to download either text files or computer programs from a central computer to a remote terminal. In an open learning context this could include: the learning material itself; tests related to the material; programs illustrating, testing or extending elements of the course; optional additional materials or raw data to be worked on.

As the student only needs to download what is required when it is required, it is an efficient, fast and now wholly reliable method of transmitting computer/readable information. The hardware which would allow a popular micro-computer to become a videotex terminal, costs under £100. The only additional costs are for telephone time, and if use is made of the public videotex system PRESTEL, a computer charge at peak times, the possibility of a charge to view certain frames and a PRESTEL registration fee. Many mainframe computers or large micros being used by educational institutions are quite capable of handling a videotex component at the marginal cost of buying in the software. Such systems are private, totally flexible and cost effective. They could be used by any number of students with the obvious proviso that certain types of hardware or software do have self imposed limitations on their expandibility.

This kind of use of a computer speeds up the communication process by taking it out of the traditional correspondence system and making it electronic. You can also offer feedback on performance via computer.

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(2) Recently the Open University published a 'Handbook for Telephone Tuition and Counselling' - written by Judith George, Deputy Director, the Open University: Scotland

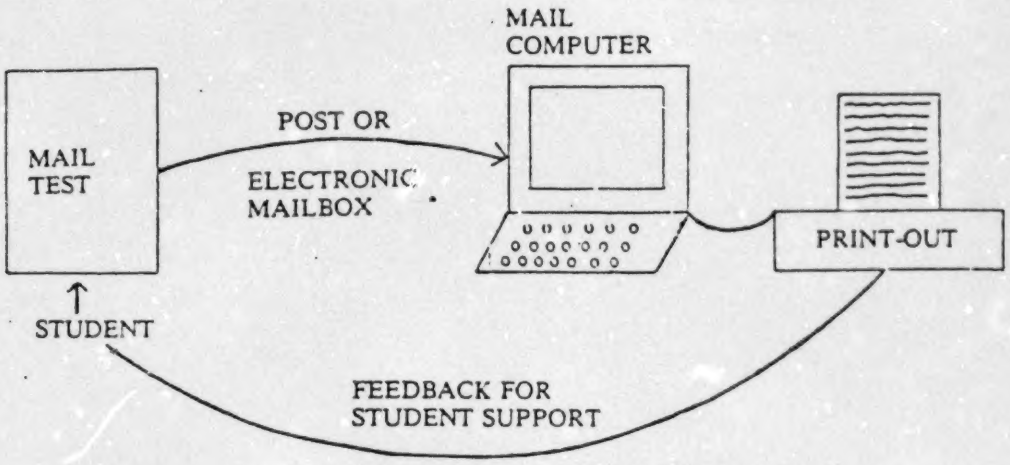
There are a number of systems which respond to a student's choice of answer in a multiple choice question by commenting in detail on his or her selection. The software package that is causing substantial interest in the UK is called MAIL. MAIL was developed by Richard Freeman, Director of the National Extension College. It is simple, flexible and effective.

It is designed to run on the most widely available micro-computer in the British educational system, the BBC Micro. MAIL is available in single or twin disk formats, for 40 or 80 track disk drives.

The tutor has to create a MAIL text of 10 questions each with four possible answers. He or she then has to write a response for each of those 40 possible answers for that particular text.

Obviously the more skilled the author is, the more successful will be the MAIL system. Students require positive feedback that can help them when they select incorrect answers, but can also extend them when they progress more or less satisfactorily through a text. A print out of "Yes, Correct" repeated ten times is not very good feedback. The distractors, then, should try and anticipate typical errors and re-direct the students into the learning material. The correct answer should move the student forward. (See Diagram 1)

Diagram 1



MAIL can be set up at a Centre and tests can be posted in and print outs posted out. This gives a far quicker turn round service than a typical correspondence tutor could manage. The best results can be entered on to the computer by any member of staff once the 'expert' has written the text and the responses. Coupled with normal Tutor/Student contact, it can substantially add to the support offered to a student.

Even ansaphones can improve student support. If they are added to direct lines, then students can leave messages, comments or requests twenty four hours per day. Even if they are not dealt with for twelve hours, it is still an immediate contact point for the student.

New Technology: Offering New Media For Learning

The three key requirements of open learning materials are that they are:

(a) individualised

(b) self-pacing

(c) interactive

The use of new technology enhances all three of these areas:

Individualising	Large stores of electronic information can allow a student to select his or her own route through learning material. The more complex the routing, the more individualised the ultimate package.
Self-pacing	If routing is individualised then the speed of absorption of the material might be controlled by the learner. A computer is a machine designed for individualised pacing activities.
Interactive	It is difficult to make print interactive; new technologies are inherently interactive. They demand a constant stream of responses from the student in order to function. If these inherent qualities are used well, it is a splendid learning medium (3)

But computers, as well as being learning machines can also control other machines such as cassette recorders, video tape machines and potentially most exciting of all: video disk players.

This allows a student's response to information on the screen - whether it be pictures or text - to control what information the student sees next. The graphics limitations of traditional computer aided learning are swept away and the student is presented with information that is offered in a variety of different ways. This aids concentration.

The potential of 54,000 frames of information laid out as text, picture, computer program or diagram which can be randomly accessed by the student is vast. A multi-media learning station such as this could capitalise on all the best aspects of open learning systems, except the flexibility to make use of the learning material wherever the student wants.

There is a direct correlation between the flexibility of use of learning material and its level of interactivity. The higher the interactivity, the more flexibly the package can be used by the learner, but this means that some of the material is not always so easily accessible to the learner wherever he or she happens to be. If the student wants to learn away from the learning centre he or she is forced to turn the material into 'hardcopy' before it can be used. Even if the material is downloaded onto a home-micro for the student, if he or she wants to take the material away then he or she is forced to rely on paper as the medium.

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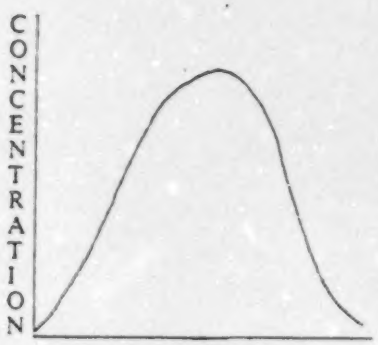
(3) see 'Information Technology and Open Learning: The Interactivity Analogue'
SCET Open Learning Paper 401 Nigel Paine March 1983

New technology can increase the flexibility, speed and mode of access of learning material, but print is still very relevant and will continue to be so. Most of the words on the page, however, will emerge from computer driven printers or photocopiers rather than traditional printing machines.

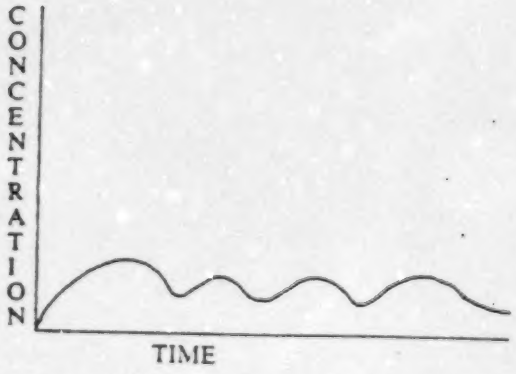
Mixing Media

Most of the large scale CAL operations of the 1960's and 70's went wrong because they assumed that all learning can be devolved to computers. In fact, adults have a smaller concentration span when working on a computer than they do when working with print. Working from a screen becomes as boring as working with paper if you are kept too long at the same task. Stimulation, concentration and motivation can be maintained by shifting across from one medium to another. (See Diagram 2)

Diagram 2



A normal concentration curve



Concentration pattern using different media

It is possible to include, in one learning package, audio tapes containing speech or music and computer software. This can be contained with printed units, slides or a video tape. What is crucial in this case is how the student is routed through the package rather than the number of separate items it contains. To the student, the only use of new technology is the software. In fact, the covering letter and the note that he or she has received, and the package itself could have been generated and registered on a computer; the audio cassette could have been processed digitally and all the learning material in print could have emerged from a word processor.

Open learning seeks to increase access to learning opportunities. New technologies offer a powerful tool to the course organiser or developer. They also offer a vast range of entry points for the potential user. Much can be achieved using low cost micros, but the use can grow according to needs, ideas and funding.

It is very difficult to draw up a definitive checklist for this area as the scope of potential developments is very large indeed. There are guidelines however:

BENEFITS	CONSTRAINTS
Speed of access to information	The student needs access to specific hardware and software
Flexibility of approach	The package will not work as specified
Increased interactivity	There will be technical hitches
Ease of moving into multi media packages	Staff will need retraining
Speed and flexibility of support	Old and new systems will need to run in parallel for a time
Instant access to the system by the student	Material will cost more to produce and distribute
Means of delivering material to the student increases	The system becomes more complicated
Learning becomes more efficient	It can be expensive
Learning becomes more exciting	Mistakes can be extremely expensive
Potential for home based learning expands	